2016

Test 2152: Kubota M5-111

Nebraska Tractor Test Laboratory
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NEBRASKA TRACTOR TEST 2152
KUBOTA M5-111 DIESEL
24 SPEED

POWER TAKE-OFF PERFORMANCE

Power HP *(kW)*	Crank shaft speed rpm	Diesel Consumption Gal/hr *(l/h)*	lb/hp.hr *(kg/kW.h)*	D.E.F. Consumption Hp.hr/gal *(kW.h/l)*	D.E.F. Consumption Gal/hr *(l/h)*	Mean Atmospheric Conditions
MAXIMUM POWER AND FUEL CONSUMPTION						
Rated Engine Speed—(PTO speed—690 rpm)						
97.09 *(72.40)*	2601	6.11 *(23.13)*	0.441 *(0.268)*	15.89 *(3.13)*	0.11 *(0.40)*	Fuel used during active exhaust regeneration-0.12 gal *(0.45 l)* (see note 1, p.2)
Maximum Power (1 hour)						
97.85 *(72.97)*	2499	6.01 *(22.75)*	0.430 *(0.262)*	16.28 *(3.21)*	0.11 *(0.40)*	
Standard Power Take-off Speed (540 rpm)						
88.68 *(66.13)*	2035	5.04 *(19.07)*	0.398 *(0.242)*	17.60 *(3.47)*	0.10 *(0.37)*	
VARYING POWER AND FUEL CONSUMPTION						
97.09 *(72.40)*	2601	6.11 *(23.13)*	0.441 *(0.268)*	15.89 *(3.13)*	0.11 *(0.40)*	Air temperature
83.77 *(62.46)*	2641	5.54 *(20.95)*	0.463 *(0.282)*	15.13 *(2.98)*	0.09 *(0.34)*	79°F *(26°C)*
63.64 *(47.46)*	2674	4.59 *(17.39)*	0.506 *(0.308)*	13.85 *(2.73)*	0.07 *(0.25)*	Relative humidity
42.95 *(32.03)*	2705	3.68 *(13.92)*	0.600 *(0.365)*	11.68 *(2.30)*	0.05 *(0.18)*	41%
21.62 *(16.12)*	2730	2.77 *(10.50)*	0.899 *(0.547)*	7.80 *(1.54)*	0.05 *(0.17)*	Barometer
2.72 *(2.03)*	2761	1.92 *(7.26)*	4.942 *(3.006)*	1.42 *(0.28)*	0.04 *(0.16)*	28.65" Hg *(97.02 kPa)*

Maximum torque - 242 lb.-ft. *(328 Nm)* at 1549 rpm
Maximum torque rise - 23.3%
Torque rise at 2081 engine rpm - 18%
Power increase at 2499 engine rpm - 0.8%

TRACTOR SOUND LEVEL WITH CAB	Front Wheel Drive Engaged dB(A)	Front Wheel Drive Disengaged dB(A)
At no load in 10th(HL5) gear	80.2	79.9
Bystander in 23th(HH5) gear	---	83.5

TIRES AND WEIGHT	Tested without ballast
Rear Tires–No., size, ply & psi *(kPa)*	Two 18.4R30; **; 12 *(85)*
Front Tires–No., size, ply & psi *(kPa)*	Two 12.4R24; **; 12 *(85)*
Height of Drawbar	17.5 in *(445 mm)*
Static Weight with operator– Rear	4915 lb *(2229 kg)*
– Front	2945 lb *(1336 kg)*
– Total	7860 lb *(3565 kg)*

Location of tests: Nebraska Tractor Test Laboratory, University of Nebraska, Lincoln Nebraska 68583-0832
Dates of tests: June 6 - 13, 2016

Manufacturer: Kubota Tsukuba Plant 10, Sakano-Shinden, Tsukuba-Mirai-City, Ibaraki, 300-2402 Japan

CONSUMABLE FLUIDS, OIL and TIME: Fuel No. 2 Diesel **Specific gravity converted to 60°/60°F *(15°/15°C)*** 0.8417 **Fuel weight** 7.008 lbs/gal *(0.840 kg/l)* **Diesel Exhaust Fluid (DEF)** 32% aqueous urea solution **DEF weight** 9.071 lbs/gal *(1.087 kg/l)* **Oil SAE** 10W-30 **API service classification** CJ-4 **Transmission and hydraulic lubricant** Kubota Super UDT2 fluid **Front axle lubricant** SAE 90 gear oil **Total time engine was operated** 10.0 hours

ENGINE: Make Kubota Diesel **Type** four cylinder vertical with turbocharger, air to air intercooler and D.E.F.(diesel exhaust fluid) exhaust treatment **Serial No.** 2FU4657 **Crankshaft** lengthwise **Rated engine speed** 2600 **Bore and stroke** 3.937" x 4.724" *(100.0 mm x 120.0 mm)* **Compression ratio** 17.0 to 1 **Displacement** 230 cu in *(3769 ml)* **Starting system** 12 volt **Lubrication** pressure **Air cleaner** two paper elements and aspirator **Oil filter** one full flow cartridge **Oil cooler** engine coolant heat exchanger for crankcase oil, radiator for hydraulic and transmission oil **Fuel filter** one paper element **Fuel cooler** radiator for pump return fuel **Exhaust** DOC (diesel oxidation catalyst), SCR (selective catalyst reduction) and regenerative DPF (diesel particulate filter) integrated within a vertical muffler **Cooling medium temperature control** one thermostat and variable speed fan

ENGINE OPERATING PARAMETERS: Fuel rate: 41.2 - 43.9 lb/h *(18.7 - 19.9 kg/h)* **High idle:** 2700 - 2800 rpm **Turbo boost:** nominal 13.1 - 16.0 psi *(90 - 110 kPa)* as measured 14.5 psi *(100 kPa)*

CHASSIS: Type front wheel assist **Serial No.** *M5-111D-52206* **Tread width** rear 59.1" *(1500 mm)* to 75.2" *(1910 mm)* front 61.8" *(1570 mm)* to 65.7" *(1670 mm)* **Wheelbase** 88.6" *(2250 mm)* **Hydraulic control system** direct engine drive **Transmission** selective gear fixed ratio with partial (2) range operator controlled powershift **Nominal travel speeds mph *(km/h)*** first 1.37 *(2.21)* second 1.63 *(2.63)* third 1.88 *(3.03)* fourth 2.24 *(3.60)* fifth 2.42 *(3.90)* sixth 2.88 *(4.64)* seventh 3.13 *(5.04)* eighth 3.72 *(5.99)* ninth 3.87 *(6.22)* tenth 4.59 *(7.39)* eleventh 5.54 *(8.91)* twelfth 6.08 *(9.78)* thirteenth 6.58 *(10.59)* fourteenth 7.23 *(11.63)* fifteenth 8.31 *(13.38)* sixteenth 9.88 *(15.90)* seventeenth 10.72 *(17.25)* eighteenth

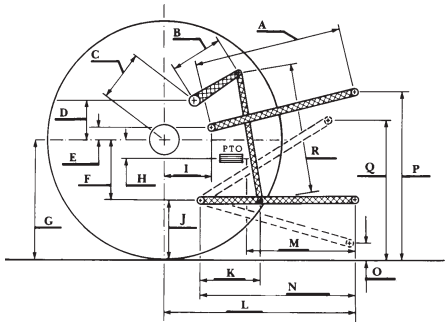
HYDRAULIC PERFORMANCE

CATEGORY: II
Quick attach: None
OECD Static test — lift cylinders

Maximum force exerted through whole range:	6192 lbs *(27.5 kN)* (2 x 75 mm)	
	4698 lbs *(20.9 kN)* (2 x 65 mm)	
i) Sustained pressure of the open relief valve:	2957 psi	*(204 bar)*
ii) Pump delivery rate at minimum pressure and rated engine speed:	17.0 GPM	*(64.4 l/min)*
iii) Pump delivery rate at maximum hydraulic power:	14.5 GPM	*(54.9 l/min)*
Delivery pressure:	2398 psi	*(165 bar)*
Power:	20.3 HP	*(15.1 kW)*

HITCH DIMENSIONS AS TESTED—NO LOAD

	inch	*mm*
A	29.1	*740*
B	11.0	*280*
C	12.0	*306*
D	11.3	*287*
E	11.3	*287*
F	9.3	*235*
G	28.4	*720*
H	0.3	*7*
I	10.4	*264*
J	19.1	*485*
K	16.3	*414*
L	38.6	*980*
M	23.8	*605*
N	31.3	*795*
O	9.1	*230*
P	43.1	*1095*
Q	34.1	*865*
R	24.4	*620*



12.74 *(20.50)* nineteenth 13.84 *(22.27)* twentieth 16.45 *(26.47)* twenty-first 17.09 *(27.50)* twenty-second 19.57 *(31.50)* twenty-third 20.31 *(32.68)* twenty-fourth 23.30 *(37.50)* electronically limited reverse 1.39 *(2.24)*, 1.65 *(2.66)*, 1.90 *(3.06)*, 2.26 *(3.64)*, 2.45 *(3.95)*, 2.92 *(4.70)*, 3.17 *(5.10)*, 3.77 *(6.06)*, 3.91 *(6.30)*, 4.65 *(7.49)*, 5.60 *(9.02)*, 6.16 *(9.91)*, 6.66 *(10.72)*, 7.31 *(11.77)*, 8.41 *(13.54)* 10.00 *(16.09)*, 10.85 *(17.46)*, 12.89 *(20.75)*, 14.01 *(22.55)*, 16.65 *(26.80)*, 17.30 *(27.84)*, 19.82 *(31.89)*, 20.56 *(33.08)* 23.55 *(37.90)* electronically limited **Clutch** multiple wet disc operated by foot pedal **Brakes** multiple wet disc operated by two foot pedals which can be locked together **Steering** hydrostatic **Power take-off** 540 rpm at 2035 engine rpm, Economy PTO 540 rpm at 1519 engine rpm **Unladen tractor mass** 7685 lb *(3486 kg)*

NOTE 1: The manufacturer declares that the average time between active regenerations is 18 hours. A 6% power loss was observed during the active exhaust regeneration process.

REPAIRS AND ADJUSTMENTS: No repairs or adjustments.

REMARKS: All test results were determined from observed data obtained in accordance with official OECD, SAE and Nebraska test procedures. The manufacturer's 3 point lift of claims of 5181 lbs *(2350 kg)* with 2 x 65 mm lift cylinders and 7275 lbs *(3300 kg)* with 2 x 75 mm lift cylinders as per SAE testing standards were not verified.

We, the undersigned, certify that this is a true and correct report of official Tractor Test No. **2152,** July 1, 2016.

Roger M. Hoy
Director

M.F. Kocher
P.J. Jasa
J.D. Luck
Board of Tractor Test Engineers

Economy mode
540 PTO rpm @1519 engine rpm

Power HP *(kW)*	Crank shaft speed rpm	Gal/hr *(l/h)*	lb/hp.hr *(kg/kW.h)*	Hp.hr/gal *(kW.h/l)*	DEF Usage Gal/hr *(l/h)*
70.69 *(52.71)*	1519	3.83 *(14.48)*	0.379 *(0.231)*	18.47 *(3.64)*	0.05 *(0.18)*
53.48 *(39.88)*	1529	2.99 *(11.32)*	0.392 *(0.238)*	17.88 *(3.52)*	0.05 *(0.19)*
35.59 *(26.54)*	1527	2.09 *(7.91)*	0.411 *(0.250)*	17.04 *(3.36)*	0.04 *(0.16)*
17.82 *(13.29)*	1528	1.33 *(5.02)*	0.521 *(0.317)*	13.44 *(2.65)*	0.03 *(0.13)*
2.07 *(1.54)*	1529	0.69 *(2.62)*	2.337 *(1.442)*	3.00 *(0.59)*	0.03 *(0.10)*

Normal mode
540 PTO rpm @2035 engine rpm

Power HP *(kW)*	Crank shaft speed rpm	Gal/hr *(l/h)*	lb/hp.hr *(kg/kW.h)*	Hp.hr/gal *(kW.h/l)*	DEF Usage Gal/hr *(l/h)*
70.99 *(52.94)*	2041	4.13 *(15.63)*	0.407 *(0.248)*	17.20 *(3.39)*	0.03 *(0.13)*
53.28 *(39.73)*	2046	3.26 *(12.32)*	0.428 *(0.260)*	16.37 *(3.22)*	0.05 *(0.20)*
35.45 *(26.43)*	2037	2.46 *(9.32)*	0.487 *(0.296)*	14.40 *(2.84)*	0.05 *(0.18)*
17.72 *(13.22)*	2042	1.72 *(6.53)*	0.682 *(0.415)*	10.28 *(2.02)*	0.05 *(0.18)*
1.94 *(1.44)*	2046	1.08 *(4.08)*	3.904 *(2.375)*	1.80 *(0.35)*	0.04 *(0.14)*

Kubota M5-111 Diesel

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